To set up a direct Ethernet connection between your Raspberry Pi and your Windows 11 PC (step 1, option 1), follow these detailed steps:

### Prerequisites:

- \*\*Raspberry Pi 3B\*\*

- \*\*Ethernet cable\*\* (connects Raspberry Pi to your PC via an Ethernet port or USB Ethernet adapter)

- \*\*USB Hub\*\* (if you need more USB ports for power or peripherals)

- \*\*Power supply for Raspberry Pi\*\* (you can power it via USB from the hub or separately)

### Overview:

We will configure your Raspberry Pi and Windows PC to communicate over Ethernet by:

1. Assigning static IP addresses to both devices.

2. Enabling SSH on the Raspberry Pi to allow remote access.

3. Verifying the connection between the two devices.

### Step-by-Step Guide:

#### 1. \*\*Prepare the Raspberry Pi\*\*

Before connecting the Raspberry Pi to your PC via Ethernet, you need to set up the Pi to allow network access (if this hasn't already been done). There are two ways to do this, depending on whether you already have a display and keyboard attached to your Pi or not:

##### Option 1: If You Have Access to a Display and Keyboard on the Pi:

- \*\*Connect your Pi\*\* to a monitor, keyboard, and mouse.

- \*\*Enable SSH\*\* (SSH allows remote terminal access over the network):

1. Open a terminal window on the Pi.

2. Run the following command to enable SSH:

```bash

sudo raspi-config

```

3. Navigate to "Interfacing Options" > "SSH" > Select "Yes" to enable SSH.

4. Reboot the Raspberry Pi:

```bash

sudo reboot

```

##### Option 2: If You Don’t Have Access to a Display/Keyboard (Headless Setup):

- If you don’t have access to a display, you can enable SSH headlessly by:

1. \*\*Insert the Raspberry Pi's SD card\*\* into your computer.

2. Open the boot partition of the SD card (this is a small partition accessible from Windows).

3. Create a new file named `ssh` (no extension) in the root of the boot partition. This enables SSH automatically when the Pi boots.

#### 2. \*\*Connect the Raspberry Pi to the PC via Ethernet\*\*

- \*\*Connect your Pi to your PC\*\* using an Ethernet cable (through the USB Ethernet adapter on your PC if needed).

- \*\*Power the Raspberry Pi\*\* (via a USB power supply or through the USB hub).

#### 3. \*\*Configure Static IP Addresses\*\*

To make communication between the Pi and your PC easy, we will assign static IP addresses to both devices.

##### A. Configure Windows 11 PC Ethernet Settings:

1. \*\*Open Network Connections\*\*:

- Press `Windows Key + X` and select \*\*Network Connections\*\*.

- In the \*\*Advanced network settings\*\*, click \*\*More network adapter options\*\*.

- Find the \*\*Ethernet adapter\*\* (connected to the Raspberry Pi) and right-click it, then choose \*\*Properties\*\*.

2. \*\*Assign Static IP to Windows 11\*\*:

- In the \*\*Ethernet Properties\*\* window, select \*\*Internet Protocol Version 4 (TCP/IPv4)\*\* and click \*\*Properties\*\*.

- Set the following static IP address:

- \*\*IP address\*\*: `192.168.1.1`

- \*\*Subnet mask\*\*: `255.255.255.0`

- \*\*Default gateway\*\*: Leave blank.

- Click \*\*OK\*\* to save changes.

##### B. Configure Raspberry Pi Static IP:

1. \*\*Access the Pi’s SD card\*\* (if headless, or if using a monitor and keyboard, use the terminal directly).

If using a display, you can edit the network settings directly on the Pi.

Otherwise, insert the SD card into your computer and find the `cmdline.txt` file in the \*\*boot\*\* partition. Here’s how to proceed:

2. \*\*Edit the Network Configuration\*\*:

- In the terminal (if you are working on the Pi), edit the `dhcpcd.conf` file:

```bash

sudo nano /etc/dhcpcd.conf

```

- At the end of the file, add the following lines to configure a static IP for the Pi's Ethernet interface (`eth0`):

```bash

interface eth0

static ip\_address=192.168.1.2/24

static routers=192.168.1.1

static domain\_name\_servers=192.168.1.1

```

3. \*\*Save the file\*\* and reboot the Raspberry Pi:

```bash

sudo reboot

```

Now, your Raspberry Pi should have the IP address `192.168.1.2`, and your PC should be at `192.168.1.1`.

#### 4. \*\*Test the Connection\*\*

After both devices have static IPs, test the connection by pinging the Raspberry Pi from your Windows 11 PC:

1. \*\*Open Command Prompt\*\* on your Windows 11 PC.

2. Type the following command:

```bash

ping 192.168.1.2

```

If the connection is successful, you should see replies from the Raspberry Pi's IP address.

#### 5. \*\*SSH into the Raspberry Pi\*\*

Once the Pi is reachable via ping, you can SSH into it from the Windows 11 PC:

1. Open a terminal on your PC (Command Prompt, PowerShell, or a terminal emulator like \*\*PuTTY\*\*).

2. \*\*Use the SSH command\*\* to connect:

```bash

ssh pi@192.168.1.2

```

- The default username for Raspberry Pi is `pi` and the default password is `raspberry` (if unchanged).

- If prompted, accept the connection by typing "yes".

Now, you should have remote access to your Raspberry Pi through the Ethernet connection.

#### 6. \*\*(Optional) Set Up VNC for GUI Access\*\*

If you want graphical access to your Raspberry Pi’s desktop (in addition to the SSH terminal), you can enable \*\*VNC\*\* for remote desktop:

1. \*\*Enable VNC on the Raspberry Pi\*\*:

- Open terminal on the Pi (via SSH or directly on the Pi if you have a display).

- Run:

```bash

sudo raspi-config

```

- Go to \*\*Interfacing Options\*\* > \*\*VNC\*\* > Enable.

2. \*\*Install VNC Viewer\*\* on your PC:

- Download and install \*\*VNC Viewer\*\* from [RealVNC's website](https://www.realvnc.com/en/connect/download/viewer/).

- Open VNC Viewer, and connect to `192.168.1.2`.

- Enter the Pi's username (`pi`) and password (`raspberry` by default).

#### 7. \*\*Test Robot Controls and Video Streaming\*\*

With the direct Ethernet connection established, you can now proceed to implement your robot control and video streaming as per the instructions provided earlier.

### Troubleshooting:

- \*\*No Ping Response\*\*: If you're unable to ping the Pi, check that the Ethernet cable is securely connected and that both devices have the correct static IP addresses.

- \*\*SSH Issues\*\*: If SSH isn’t working, make sure SSH is enabled on the Pi and check firewall settings on your PC.

- \*\*Network Conflicts\*\*: Ensure no other devices are using the `192.168.1.x` range on the PC or the Pi.

Now your Raspberry Pi is directly connected to your Windows 11 PC over Ethernet, and you can send control commands and receive video streams efficiently.

A képen szöveg, képernyőkép, Betűtípus, sor látható

Automatikusan generált leírás

scp -r sentry heroczi@192.168.100.2:/home/heroczi/

workflow:

pc-n szerkesztem a "D:\Dipterv2024\Diplomamunka\_2024\documentation\CODE\sentry" mappában levő fileokat

Mikor kész vagyok nyitok 2 cml-t:

1. A "D:\Dipterv2024\Diplomamunka\_2024\documentation\CODE\" mappában, itt a **scp -r sentry** [**heroczi@192.168.100.2:/home/heroczi/**](mailto:heroczi@192.168.100.2:/home/heroczi/)paranccsal átmásolok mindent a raspberry-re
2. SSH-val belépek a sentryre : **ssh** [**heroczi@192.168.100.2**](mailto:heroczi@192.168.100.2) Ezután bele cd-zek a /home/heroczi/ mappába és futtatom bármelyik python programot